Moxa TCC-120/120I
User's Guide

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Moxa TCC-120/120I User's Guide

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Introduction

The TCC-120 and TCC-120I are RS-422/485 isolated repeaters, and the TCC-120I comes with 2 KV isolation protection.

The following topics are covered in this chapter:

- **Overview**
  - Introduction
  - Built-in RS-485 ADDC™ Intelligence
  - Isolation
  - Reverse Power Protection
  - DIP Switch Selectable Terminator
  - Auto Baudrate Detection
- **Product Features**
- **Package Checklist**
- **Product Specifications**
- **Product Views**
- **LED Indicators**

Overview

Introduction

Many important devices used in today's industrial environment use the RS-422 or RS-485 interface for data transmission. In some cases however, it is necessary to extend the transmission distance between RS-422/485 devices. This is where the TCC-120/120I RS-422/485 Repeaters come in. Simply wire the power terminal block, wire the two signal terminal blocks, set the DIP switches, and you're ready to go.

The RS-422/485 standards use a differential signal for transmitting data signals. In addition to distance and multi-drop issues for industrial applications, housing, wiring, power supply, and over-surge protection are also serious concerns.

The TCC-120I provides isolation protection for users who need an industrial grade repeater to extend RS-422/485 transmission distance and increase networking capability. The superior industrial application design of this product, which includes Wall mounting, terminal block wiring, external terminal block power, and optical isolation for system protection, makes the TCC-120/120I suitable for use in critical industrial environments.

Built-in RS-485 ADDC™ Intelligence

ADDC™ (Automatic Data Direction Control), a Moxa leading technology, uses a clever hardware solution to take care of the RS-485 data flow control problem. ADDC™ is a hardware data flow solution that automatically senses and controls data direction, making the handshaking signal method unnecessary.

Isolation

Moxa's electrical isolation technology uses two photo couplers to create a gap in each electrical signal. One photo coupler transforms the electrical signal into a light signal, which is transmitted across a small gap, and then the other photo coupler transforms the light signal back into an electrical signal. In this way, the two electrical circuits are completely isolated from each other, limiting the damage that could otherwise be caused by ground loops in the electrical signal.

Reverse Power Protection

The Reverse Power Protection feature provides extra protection against accidentally connecting the power cables to the wrong terminal. The converter is designed to automatically detect which power wire is positive and which is negative, and then adjust the power supply accordingly.

DIP Switch Selectable Terminator

For many products of this type, the termination resistor is set by a jumper located inside the product's casing, so that the user must open the casing to disable or change the resistor's strength. Moxa offers a better solution. The TCC-120/120I's terminator is set with a DIP Switch located on the outside of the converter's casing.

Auto Baudrate Detection

The TCC-120/120I incorporates a method for automatically detecting the serial signal's baudrate by hardware. This is an extremely convenient feature for the user. Even if a device's baudrate changes, the signal will still be transmitted through the RS-422/485 repeater without any problems.

Product Features

- Boost serial signal for extending transmission distance up to an additional 1.2 km
- Wall or DIN-Rail mountable
- Terminal block for easy wiring
- Power input from terminal block
- DIP switch setting for built-in terminator(120 ohms)
- PWR, Tx, Rx LEDs
- Operating temperature from -20 to 60°C
- 2 KV Isolation (for the TCC-120I)

Package Checklist

Before installing the TCC-120/120I, verify that the package contains the following items:

Standard Accessories:

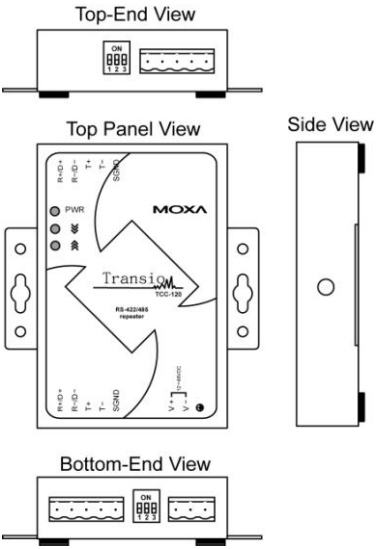
- TCC-120 or TCC-120I
- User's Guide
- Warranty Card
- DIN-rail Mounting Kit

Please notify your sales representative if any of the above items is missing or damaged.

Product Specifications

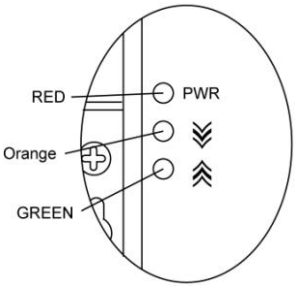
Model Names	**TCC-120, TCC-120I**	
Communication		
Signals for 2-wire (RS-485 2-wire)	Data+, Data-, SGND	
Signals for 4-wire (RS-422 or 4-wire RS-485)	Tx+, Tx-, Rx+, Rx-, SGND	
RS-485 Data Direction Control	ADDC™	
Baudrate	50 bps to 921.6 Kbps	
Isolation	2 KV for both Power and Signal (TCC-120I)	
Environmental		
Operating Temperature	-20 to 60°C	
Storage Temperature	-20 to 85°C	
Humidity	5 to 95 %RH	
Power		
Input Power Voltage	External 12-48 VDC Power, Terminal Block	
Reverse Power Protection	Protects against V+/V- reversal	
Over Current Protection	Protects against 2 signals shorted together	
Power Consumption	**TCC-120:**	**TCC-120I:**
	65mA @ 12V	180mA @ 12V
	37mA @ 24V	90mA @ 24V
	26mA @ 48V	52mA @ 48V
Mechanical		
Dimensions (W × D × H)	67 × 100 × 22 mm (casing only) 90 × 100 × 22 mm (including ears)	
Housing	Aluminum	
Plug-In Screw Terminal Block	#22 – #16 AWG	
Color	Black	
Weight	148±5 g	
Regulatory Approvals	CE, FCC (Class A), UL-60950-1	

Product Views



LED Indicators

The TCC-120/120I's top panel contains three LED indicators, as described in the table below:



LED Name	LED Function	
PWR	Red indicates the power is on.	
⩔	Orange	Data is entering through the top-end port and exiting through the bottom-end port.
⩓	Green	Data is entering through the bottom-end port and exiting through the top-end port.

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Installation

This chapter includes information about how to install the TCC-120/120I.

The following topics are covered in this chapter:

- **Hardware Installation**

Hardware Installation

Five steps are required to install the TCC-120/120I:

- **STEP 1: Set the terminator DIP Switches**
- **STEP 2: Attach the Power Supply**
- **STEP 3: Wire the RS-422/485 Terminal Blocks**
- **STEP 4: Test the Connection**
- **STEP 5: Placement**

The details of each of these five steps are described next.

STEP 1: Set the DIP Switches

The DIP Switches on the TCC-120/120I are used to set the signal transmission mode and to enable or disable the termination resistor. You can configure for either 2-wire (RS-485) or 4-wire (RS-422/485) transmission mode. Also note that your program and serial port should be set to match the repeater's settings.

NOTE The TCC-120/120I has two sets of DIP Switches—one set on the top-end and the other set on the bottom-end. To ensure proper data transmission, make sure that the two sets of DIP switches are configured.

SW1— Switch 1 selects RS-422 or RS-485 mode. The default is "On" for RS-422 mode.

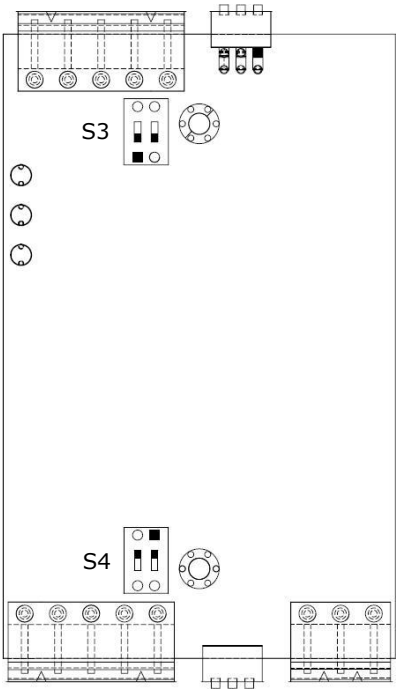
SW2— Switch 2 selects 2-wire or 4-wire RS-485 mode. The default is "On" for 4-wire RS-485. Note that if Switch 1 is set to RS-422 mode, then Switch 2 is inactive.

SW3— Switch 3 enables the terminator to 120 Ohms. When enabled, the 120- Ohm resistor prevents signal reflection during RS-485 transmission. The default is "On" to enable the terminator. If your particular application does not require the termination resistor, simply disable it by setting Switch 3 to the off position.

Dip Switch Settings				
RS-422 Terminator active	SW1	SW2	SW3	
	ON	ON	ON	
RS-422	SW1	SW2	SW3	
	ON	ON	OFF	
4-wire RS-485 Terminator active	SW1	SW2	SW3	
	OFF	ON	ON	
4-wire RS-485	SW1	SW2	SW3	
	OFF	ON	OFF	
2-wire RS-485 Terminator active	SW1	SW2	SW3	
	OFF	OFF	ON	
2-wire RS-485	SW1	SW2	SW3	
	OFF	OFF	OFF	

NOTE These switch settings apply for product revision 1.3 and later; for the switch settings of previous product revisions, refer to the label on the rear panel for the correct information.

The newly implemented DIP-2 (S3 and S4) switches are used to configure the pull high/low resistors for different applications.

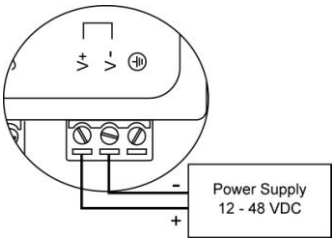


Pull High/Low Resistor	DIP-2 SW1	DIP-2 SW2
150K	OFF	OFF
1K (default)	ON	ON

NOTE We recommend setting the pull high/low resistor to 1K (ON/ON) when termination is enabled.

NOTE These switches are for pull high/low resistor settings. These features are available on product version 1.3 and later.

STEP 2: Attach the Power Supply

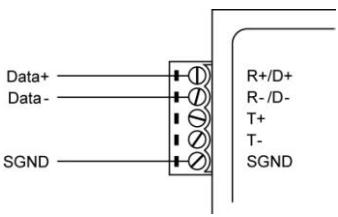


The TCC-120/120I is powered by an external 12-48 VDC power supply. To connect to the power supply, run two wires from the V+ and V- terminals, on the TCC-120's 3-connector terminal block, to the DC power supply, as shown in the figure on the left.
Once the power supply is connected to its power source, the PWR LED located on the TCC-120's top panel should be illuminated in red.

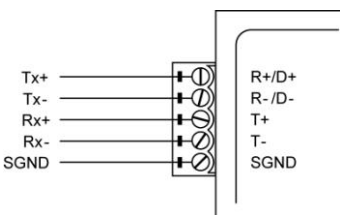
NOTE The TCC-120/120I provides reverse power protection. It will automatically detect which power wire is negative, and which is positive.

STEP 3: Wire the Terminal Block

There are two wiring options available for connecting to the TCC-120/120I's RS-422/485 terminal block.



2-wire
When using the 2-wire (for RS-485) wiring option, you will need to connect three wires from each of the TCC-120/120I's RS-422/485 terminal blocks to the opposite connections. Connect from R+/D+ to Data+, from R-/D- to Data-, and from SGND to SGND.



4-wire
When using the 4-wire (for RS-422 or 4-wire RS-485) wiring option, you will need to connect five wires from each of the TCC-120/120I's RS-422/485 terminal blocks to the opposite connections. Connect from R+/D+ to Tx+, from R-/D- toTx-, from T+ to Rx+, from T- to Rx-, and from SGND to SGND.

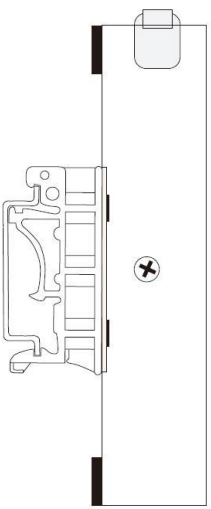
STEP 4: Test the Connection

After setting the DIP Switches, connecting the power, and wiring the terminal block, we suggest using a Console Terminal program, such as HyperTerminal or Moxa Terminal Emulator, to test the connection. If you have an RS-422/485 serial board (such as Moxa Industio CP-132) installed on your PC, you can connect your PC's COM port to one of the TCC-120/120I's RS-422/485 terminal blocks, and connect the TCC-120/120I's other RS-422/485 terminal block to one of the RS-422/485 serial board's ports. Next, start HyperTerminal or Moxa Terminal Emulator, and then open a connection to the COM port, and to the port associated with the TCC-120/120I's RS-422/485 port. Simply type a few characters on your PC's keyboard. The characters you type should show up in the HyperTerminal window that is currently inactive, indicating that the typed characters were transmitted between the TCC-120/120I's two RS-422/485 ports.

STEP 5: Placement

In addition to placing the TCC-120/120I on a desktop or other horizontal surface, you may also make use of the DIN-Rail or wall mount options, as illustrated here.

DIN-Rail



Wall Mount